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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,956	01/24/2002	Takayuki Matsushima	111719	4822

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EXAMINER	
FEELY, MICHAEL J	

ART UNIT	PAPER NUMBER
1712	

DATE MAILED: 04/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/053,956	MATSUSHIMA, TAKAYUKI	
	Examiner	Art Unit	
	Michael J Feely	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17,19 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17,19 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Pending Claims

2. Claims 1-17, 19, and 20 are pending.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The rejection of claims 1-20 under 35 U.S.C. 112, first paragraph, has been overcome by amendment.

Specification

5. The objection to the disclosure has been withdrawn.

Claim Rejections - 35 USC § 102

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. The rejection of claims 1-3, 5, and 7-15 under 35 U.S.C. 102(b) as being anticipated by Nakai et al. (US Pat. No. 5,492,968) has been overcome by amendment.

8. The rejection of claims 1-4, 6, and 8-14 under 35 U.S.C. 102(e) as being anticipated by Kageishi et al. (US Pat. No. 6,274,671) has been overcome by amendment.

Claim Rejections - 35 USC §102/103

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. The rejection of claim 15 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kageishi et al. (US Pat. No. 6,274,671) has been overcome by amendment.

Previously Indicated Allowable Subject Matter

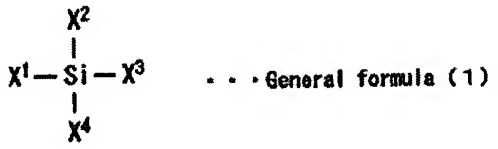
11. The indicated allowability of claims 16-20 is withdrawn in view of the newly discovered reference(s) to Tsutsumi et al. (US Pat. No. 6,361,879), Harada et al. (US Pat. No. 6,555,602), and Murai et al. (US Pat. No. 6,437,090). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

12. Claims 16 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Murai et al. (US Pat. No. 6,437,090).

Regarding claims 16 and 17, Murai et al. disclose ***(16)*** an electric device comprising a semiconductor chip and a substrate (column 3, lines 8-13), wherein an adhesive is disposed between the semiconductor chip and said substrate and is cured by heating (column 3, liens 8-13; column 81, lines 24-38); and ***(17)*** an electric device (column 3, lines 8-13) comprising a glass substrate and a substrate (column 3, lines 8-13; column 81, lines 24-38); wherein an adhesive is disposed between the glass substrate and said substrate and is cured by heating (column 3, lines 8-13; column 81, lines 24-38);

the adhesive including a resin component (column 40, lines 38-45), a metal chelate (column 40, lines 38-45; column 26, lines 11-24; column 22, lines 19-37; column 23, line 43 through column 25, line 65), and a silane coupling agent (column 26, lines 11-61), wherein said resin component includes a thermosetting resin (column 40, lines 38-45) and a silane coupling agent is composed of a silane compound represented by general formula (1):

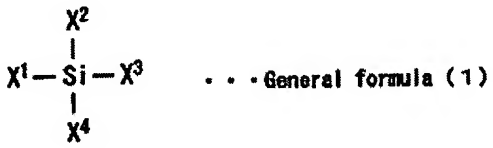


wherein at least one substituent X^1 through X^4 is an alkoxy group, and wherein if one or more of the substituents X^1 through X^4 is a substituent other than the alkoxy group, such substituent other than alkoxy group is a substituent that includes in its structure a functional group selected from the group consisting of epoxy ring, vinyl group, amino group, mercapto group, and methyl group (column 26, lines 40-61)

Claim Rejections - 35 USC § 103

13. Claims 1-15, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutsumi et al. (US Pat. No. 6,361,879) in view of Harada et al. (US Pat. No. 6,555,602).

Regarding claims 1, 4, 5, 9-14, and 19-20, Tsutsumi et al. disclose ***(1)*** an adhesive (Abstract) comprising a resin component (column 3, lines 17-36), a metal chelate (column 4, lines 17-46), and a silane coupling agent (column 4, lines 47-56), wherein said resin component includes a thermosetting resin (column 3, lines 17-36) and a silane coupling agent is composed of a silane compound represented by general formula (1):



wherein at least one substituent X^1 through X^4 is an alkoxy group, and wherein if one or more of the substituents X^1 through X^4 is a substituent other than the alkoxy group, such substituent other than alkoxy group is a substituent that includes in its structure a functional group selected from the group consisting of epoxy ring, vinyl group, amino group, mercapto group, and methyl group (column 4, lines 47-56); ***(4)*** wherein at least one of the substituents X^1 through X^4 of said silane compound is a substituent other than alkoxy and at least one of said substituents other than alkoxy has an epoxy ring (column 4, lines 47-56); ***(5)*** wherein at least one of the substituents X^1 through X^4 of said silane compound is a substituent other than alkoxy and at least one of said substituents other than alkoxy has a vinyl group (column 4, lines 47-56); ***(9 & 10)*** wherein said resin component includes a thermoplastic resin and an amount of said thermoplastic resin is 10 parts by weight or more with respect to 100 parts by weight of said thermosetting resin (column 4, lines 10-17); ***(11)*** wherein said thermosetting resin is an epoxy resin (column 3, lines 17-36); ***(12)*** wherein the epoxy resin is an alicyclic epoxy resin (column 3, line 24); ***(13 & 14)*** wherein said metal chelate includes aluminum chelate as a major component; and ***(19)*** wherein the metal chelate is a powder or liquid (column 4, lines 17-46).

Tsutsumi et al. teach the use of metal chelate curing catalyst (column 4, lines 17-46), including tri(acetylacetonato)aluminum; however, they fail to teach ***(1)*** the microencapsulation of this metal chelate catalyst, ***(20)*** wherein the microcapsules are formed as an absorbent resin particles dispersed in the adhesive.

Harada et al. disclose an epoxy composition that is analogous to the composition of Tsutsumi et al., wherein both compositions are used for semiconductor encapsulation. The following is a side-by-side comparison of the two compositions:

Tsutsumi et al. (US Pat. No. 6,361,879)	Harada et al. (US Pat. No. 6,555,602)
(A) Epoxy resin *(column 3, lines 17-36)*	(A) Epoxy resin *(column 4, line 15 through column 5, line 63)*
(B) Curing agent (including anhydride) *(column 3, lines 37-58)*	(B) Anhydride curing agent *(column 5, line 64 through column 6, line 27)*
(C) Filler *(column 3, line 59 through column 4, line 2)*	(D) Filler *(column 11, lines 22-47)*
(D) *Optional* elastomer or thermoplastic *(column 4, lines 3-17)*	
Curing catalyst, including metal chelates *(column 4, lines 17-46)*	(C) Core-shell microencapsulated curing catalyst (liquid or solid) *(column 6, line 27 through column 7, line 34)*
Silane coupling agent *(column 4, lines 47-56)*	Silane coupling agent *(column 11, lines 52-63)*
Optional additives, such as flame retardants *(column 4, lines 57-65)*	*Optional* additives, such as flame retardants *(column 11, line 64 through column 12, line 60)*

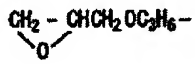
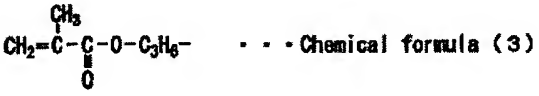
The above table demonstrates that the references are analogous art. The one distinct difference is that Harada et al. teach the use of a core-shell microencapsulated curing catalyst, wherein the catalyst core is coated with a polymeric shell material; however, they fail to explicitly teach the use of a metal chelate catalyst core. The catalyst requirement of Harada et al.

is, "the cure accelerator to be (micro)encapsulated as a core portion in the foregoing microcapsule type curing accelerator is not specifically limited ***so far as it acts to accelerate curing reaction***," (column 6, lines 56-59), wherein the advantage of using this core-shell microencapsulated catalyst is that, "the resin composition for semiconductor encapsulation comprising such a microcapsule type cure accelerator incorporated therein exhibits extremely prolonged pot life and thus is excellent particularly in storage stability," (column 6, lines 40-44).

In light of this, Tsutsumi et al. demonstrate that metal chelates, including tri(acetylacetonato)aluminum, are suitable materials ***to accelerate (the) curing reaction*** of this particular resin system; hence, these chelates would qualify as a suitable core catalyst material for the microencapsulated catalyst taught by Harada et al. One skilled in the art would be motivated to use such a microencapsulated catalyst in the composition of Tsutsumi et al. in order to extend pot life an storage stability.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have used a microencapsulated metal chelate (including and aluminum chelate) catalyst formed as absorbent resin particles and dispersed in the adhesive, as suggested in Harada et al., in the epoxy composition of Tsutsumi et al. because Harada et al. teach an epoxy resin composition for semiconductor encapsulation that is analogous to the one taught by Tsutsumi et al., wherein the curing catalyst is a core-shell microcapsule featuring as polymeric shell and a catalyst core that is not limited so far as it acts to accelerate the curing reaction of the epoxy composition, resulting in prolonged pot life and excellent storage stability.

Regarding claims 2, 3, 6 and 7, Tsutsumi et al. disclose, "preferably, the silane coupling agent for use herein has an alkoxy group and "a hydrocarbon group with a functional group of,

for example, epoxy group, amino group, mercapto group or the like bonding thereto" both bonding to the silicon atoms constituting it," (column 4, lines 52-56); however, they do not explicitly disclose that: ***(2)*** said alkoxy group is a methoxy group; ***(3)*** said alkoxy group is an ethoxy group; ***(6)*** said substituent having the epoxy ring is a γ-glycidoxypropyl group represented by chemical formula (2)  ; and ***(7)*** said substituent having the vinyl group is a γ-methacryloxypropyl group represented by chemical formula (3)  .

As set forth above, Harada et al. disclose an epoxy composition that is analogous to the epoxy composition of Tsutsumi et al. Harada et al. disclose, "examples of the silane coupling agent employable herein include γ-mercaptopropyl trimethoxysilane, ***γ-glycidoxypropyl methyl diethoxysilane***, β-(3,4-epoxycyclohexyl)ethyltrimethoxysilane, ***γ-methacryloxypropyl trimethoxysilane***, and amino group-containing silane," (column 11, lines 57-62). Because the two prior art composition are analogous, Harada et al. demonstrates that: methoxy and ethoxy are suitable alkoxy groups; γ-glycidoxypropyl is a suitable epoxy functional group, and γ-methacryloxypropyl is a suitable vinyl functional group for the silane coupling agent used in Tsutsumi et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have used a silane coupling agent featuring: methoxy or ethoxy groups, γ-glycidoxypropyl, and γ-methacryloxypropyl, as taught by Hanada et al., in epoxy composition of Tsutsumi et al. because Harada et al. teach an epoxy resin composition for semiconductor

encapsulation that is analogous to the one taught by Tsutsumi et al., wherein the silane coupling agent is selected from a group including γ-glycidoxypropyl methyl diethoxysilane, and γ-methacryloxypropyl trimethoxysilane, resulting in improved adhesion.

Regarding claim 8, Tsutsumi et al. disclose the adhesive composition according to claim 1, wherein an amount of the metal chelate is from 0.1 parts by weight to 20 parts by weight with respect to 100 parts by weight of said resin component (column 4, lines 43-46); however, both Tsutsumi et al. and Harada et al. are silent regarding the amount of silane coupling agent being from 0.1 to 35 parts by weight with respect to 100 parts by weight of the resin component.

Applicant fails to show criticality for this range, and one skilled in the art would recognize that the concentration of a coupling agent is a result effective variable. A coupling agent is added to enhance adhesion properties of a composition, wherein a very low quantity would not provide a noticeable effect on the adhesion properties, and a very high quantity would jeopardize the integrity and processability of the composition. Furthermore, it has been found that, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have used 0.1 to 35 parts by weight of silane coupling agent based on 100 parts by weight of epoxy resin in the composition based on the combined teachings of Tsutsumi et al. and Harada et al. because applicant fails to show critically for this range, and the optimization of a result effective variable is not an inventive concept.

Regarding claim 15, the claimed adhesive film is "***obtainable*** by forming and adhesive into a sheet." This claim language is open to other methods of "obtaining" the adhesive film, including, "sealing semiconductor chips in a wafer" with the resin (see column 2, lines 15-23 of Tsutsumi et al.) and filling, "the gap between the wiring circuit board and the semiconductor element being sealed," (see column 2, lines 7-17 of Harada et al.). Therefore, the combined teachings of Tsutsumi et al. and Harada et al. are as set forth above in claim 1 and incorporated herein to meet the limitations of claim 15.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J Feely whose telephone number is 571-272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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April 21, 2004